DRAFT

Acorn Planting

PROJECT REPORT

REFUGE: Mississippi Wetland Management District (MWMD)

DATE: 01/20/93

PROJECT TITLE: Habitat Restoration Investigations

STUDY TITLE: Evaluation of Reforestation Efforts (Pilot Project)

OBJECTIVE:
1. Evaluate (quantitatively) success and survival of direct seeding of bottomland hardwood tree species on all lands planted by MWMD.
2. Evaluate natural regeneration on selected sites representing both small (< 200 ac.) and large (> 200 ac.) acreage.
3. Evaluate plot-count sampling methodology.

PREPARED BY: Steven Hill, Wildlife Biologist

INTRODUCTION

Reforestation of bottomland hardwoods was initiated at the Mississippi Wetland Management District (MWMD) on National Wildlife Refuge and private lands in 1989. All tracts had past cropping history and were in an early successional vegetation stage at time of planting. Poorly drained, heavy clay soils were typical on all sites.

METHODS

Direct seeding was mechanically conducted following the methods of Allen and Kennedy (1989) using the following species; nuttall (Q. nuttalli) oak, water (Q. nigra), willow (Q. phellos). Approximately 1,200 - 1,500 acorns per acre were planted in 15 foot x 3 foot row spacings. Site preparation was not conducted on the sites. The number of stems and their distribution was measured using two, plot-count methods: a. 1/10 acre (11.9' radius) plots that were randomly located along transects that were perpendicular to the direction of planting, b. 100'x 15' rectangular plots located along planting furrows. A successful planting is defined as the presence of 125 oak stems per acre.

RESULTS

Direct Seeded Bottomland Hardwoods:

A total of 3,909 acres on 25 tracts over the 3-year period (1989-1991 were evaluated (Table 1). Forty-four percent of the total acres planted were successful. The number of stems/acre based on total acres planted ranged as follows: 0 stems/acre on 12.7% , 5-10

Table 1. Total acreage and success of direct oak seeding on National Wildlife Refuge and Private lands in Mississippi.

YEAR PLANTED	TOTAL ACRES	NO. ACRES SUCCESSFUL	PERCENT SUCCESSFUL	NO. TRACTS PLANTED/ NO. TRACTS SUCCESSFUL
1989	500	375	75.0%	3/2
1990	1,838	120	6.5%	13/2
1991	1,571	1,226	78.0%	9/8

Table 2. Season planted and success of direct oak seeding on National Wildlife Refuge and Private lands in Mississippi.

YEAR PLANTED	SEASON PLANTED		
	SPRING	FALL	SUMMER
1989	*	100.0%	0.0%
1990	6.7%	22.4%	0.0%
1991	100%	74.6%	*

* No plantings were conducted during this season.

Success : a site is considered successful if the average stem count of planted oak species is at least 125/acre. Percent success presented is number of successful acres/total acres.

stems/acre on 33.4% , 40-100 stems/acre on 9.7% , 150-175 stems/acre on 13.8% , 300-350 stems/acre on 17.2% , and 550-600 stems/acre on 13.2%. There was consistent differences in success with regards to season planted (Table 2). Poor success in the spring and overall in 1990 may be attributed to the use of low quality acorns and plantings that were conducted in the summer months. The least desirable months for planting in the South is the summer period when the soil is normally hot and dry.

Natural Regeneration:

Levels of natural regeneration were evaluated on 13 sites (2,253 ac.) ranging from 35 acres to 825 acres. Natural regeneration consisted of a variety of species. In order of species abundance we encountered willow oak, red maple, elm, green ash, sweet gum, cottonwood, and black willow.

The number of stems/acre ranged from 0 to 400 depending on tract size, width, distance to nearest tree line and flooding frequency allowing natural seed dispersal and invasion. Sites with greater than 100 stems/acre were relatively small (<100 ac.) and narrow (<200 feet from tree line). On tracts where the nearest tree line was beyond 1/4 mile there was little or no natural regeneration present.

Monitoring (sampling) Methodology:

The number of stems and their distribution was measured using two sample plot location methods: a. 1/100 acre plots randomly located along transects perpendicular to the direction of planting, b. 100'x 15' rectangular plots located along planting furrows. Sampling intensity was conducted at 0.41% and 0.27% levels respectively. Method (a) was used on sites where planting lines had not been previously marked at time of planting. All sample sites containing oak seedlings were permanently marked to facilitate future inventory.

Sampling intensity was chosen after conducting a pre-inventory survey establishing the time factor involved with setting up transect lines and conducting a plot search for seedlings. Travel time expended to and from each site and our main headquarters was recorded. The project's goal for 1992 was to sample all properties within a 3 to 4 week period after the first frost utilizing a two-person crew. Most days two to three properties (approximately 600 ac) conducting 40-60 sample points were completed. The actual time involved in setting up and conducting each sample plot (10 minutes) was small compared to the time consumed negotiating drainage ditches , loading and unloading all terrain vehicle vehicles and travel time between our main office and each property.

DISCUSSION

Haynes and Moore (1987) reported that in Region 4, Fish and Wildlife Service (FWS) , only qualitative data existed on the success of direct seeding conducted by FWS and that still continues today. This pilot project was an initial attempt to quantify success of reforestation efforts. Comparisons with other FWS refuges and state agencies with regards to success of plantings was not conducted due to this lack of quantitative data.

The sampling intensity reported in this pilot project appeared to be to low to enable the determination of success with any degree of confidence. Man-hours expended utilizing this sampling methodology and intensity is not warranted for the level of results obtained. Additional information is needed to determine the best type of sampling methodology and intensity that will allow determination of site failure or success with some stated level of accuracy. The methodology must be efficient and easily incorporated into the work-load of refuge stations.

Informational needs and field observations:

* investigate the use of the stocked-quadrat method which is quicker to conduct and more reliable. Appropriate statistics can be determined with smaller sample sizes.

* sites should be at least two years old before they are evaluated which should aid in increased seedling visibility.

* locating seedlings: seedling size (2") after being planted in 1990 (delayed germination) and/or many seedlings had been chewed off and resprouted presenting a problem in actually finding seedlings. Difficulty in actually locating seedlings in heavy vegetation.

* survey sites after the first frost which will increase visibility of seedlings.

* levels of animal damage observed to be very high (rabbits).

* free-to-grow seedling (distribution), cannot assume regular dropping by planter. We found several situations were 10 seedlings had germinated within a two foot line.

* because of low levels of natural regeneration observed in this project the potential of planting other plant species (shrubs) by broadcasting seeds on prepared soil should be investigated.

  See: Wunz,G.A. and L.M.Lang 1981. Broadcast seeding clear-cuttings to increase shrub and tree variety for wildlife. Penn Game Commission. Trans. 38th NE Section Wildl. Soc. 1981. pp 23-28.

REFERENCE LITERATURE

Allen,J.A. and H.E. Jennedy,Jr. 1989. Bottomland hardwood reforestation in the lower Mississippi Valley. U.S. FWS and U.S. FS report. Southern Hardwoods Laboratory. 28P.

Bonner, F.T. 1973. Storing red oak acorns. Tree Planters Notes. 24(3):12-13.

Johnson, J.L. 1983. Nuttall oak direct seedings still succesful after 11 years. Res. Pap.SO-301, New Orleans, LA: U.S. Department of Agriculture, Forest Service, Souther Forest Experiment Station. 3p.

_____ and R.M. Krinard. 1987. Direct seeding of southern oaks- a progress report. In: Proceedings 15th annual hardwood symposium of the Hardwood Research Council; Memphis, TN.

Haynes,R.J. and L.Moore. 1987. Reestablishment of bottomland hardwoods within national wildlife refuges in the Southeast. In: Proceedings-Increasing our wetland resources. National Wildlife Federation. Washington, D.C.

Kennedy, H.E.,Jr. 1990. Hardwood reforestation in the South: Landowners can benefit from conservation reserve program incentives. Res. Pap.SO-364, New Orleans, LA: U.S. Department of Agriculture, Forest Service, Souther Forest Experiment Station. 6p.

Date: December 21, 1994

From: T. Jacobson

Subject: Annual survey of acorn planting.

To; S. Gard

I have updated and organized the files from Kennith (File cabinet in shop next to cooler) so that now all the reforestation projects are filed in one place with maps and completed survey forms.

* After working on this project for my first year, I would like to make the following recommendations: 1) Require a map(s) for each project to be kept in the reforestation file. This map(s) must show the reforestation site including planting direction of rows and must show the location of the property with directions on finding the reforestation site. 2) The contractor or whom ever plants needs to complete a work accomplishment form stating the date when the property was planted, method(s) used, weather/soil conditions, and provide a map showing the site planted and direction of rows. 3) Check the property only after one complete calendar year has past. (If property was planted in the winter or spring, it should not be surveyed that same fall).

1994 Synopsis of Reforestation Effort

As best as I can figure we planted 6 properties in calander year 1994; which are the following:

Dahomey
Gillion
Harland
Starr
Tallahatchie
Watts

We did not check the following properties in 1994 (this fall):

Allen Dale Farms
Cook
Dahomey
Hoop
Lindsey
Oliver
Povall
Riley
Ross
Rushing
L. Weir
R. Weir
Wilkins

*Need file w/maps

Hawkins*
Saunders*
Tall
Whitten
Trainer tract II

We could not check the Double Cypress plantings due to high water over the road (road washed out).

Seedlings: Few = < 4.9 Average # seedlings/100 ft. row
Many = > 5.0 Average # seedlings/100 ft. row
= ≥ 140 seedlings per acre

Volunteer: Few = ≤ than 2 volunteer trees along 100 ft. row OR only a few trees scattered throughout field
Many = > than 2 volunteer trees along 100 ft. row OR many trees found all over field

? = No data available (nothing written on survey form).
* we looked around and only found a total of 2 oak seedlings

1994

Property	Seedlings			Volunteers		
	None	Few	Many	None	Few	Many
Atkinson		X		X		
Bassie	X			X		
Biles	X			X		
Bowling	X				X	
Charleston Farms (Winchester)			X			X
Cockerham		X		?		
Deloach			X	X		
Dodson	X				X	
Dunlap			X	?		
Edwards			X			X
Gillon			X		X	
Grant (Riverland)	X*				X	
Gwin		X	X		X	
Hester		X			X	
James		X				X
Jenkins			X			X
Jones (McCroy)			X		X	
Kolle		X			X	
Lott			X	X		
Madden		X		X		

Paducah Wells (M. Campbell)		X			X	
Riley	X				X	
Robertson		X			X	
Spears	X			?		
Starr	X			X		
Strider *		X				X
Swearengen			?			X
Trainor IV		X				X
Trainor III			X		X	
Trainor II			X	X		
Watts				X		
D. Williams	X			X		
E. Williams		X		?		

* part of planted property was replanted with pine (no oaks) approx. 220/760 was successful

	Date Planted	Acres	oak s/Acre	nat. reg. s/Acre	method
Jenkins	9/90	40	115	640	mechanical
SAUNDERS	4/93	60	112	126	HAND
HAWKINS	4/93	34	0	0	HAND
Williams, Earl	4/93	29	84	112	Hand
Strawbridge	9/90	98	126	343	mech.
Whitaker	4/91	25	100.8	2007	HAND
Marascalaco	10/90	40	0	1525	mech.
Lindsey (Junkyard)	4/93	11	0	70	SEEDLINGS
Campbell, Mike	4/92	13.5	28	1302	HAND
Strider	93 ?	?	119	0	MECH.
Robertson	9/91	300	215.6	28	MECH.
Dunlap	5/91	60	280	168	Hand
Kolle	4/93	50	56	0	Hand
Povall	10/91	?	106.4	64	MECH.
Wilkins	6/90	825	0	11.2	MECH.
Gwin	3/93	250	72.8	NOT ON LINES CHECKED	/Hand/Seedl
Ross	10/91	345	0	8	MECH
Weir, Louis	'89/91	200	240.8	121.3	MECH.
Weir, Ray	'89/'91	175	212.8	151.2	MECH.
Cook	5/90	35	28	401.3	MECH.
Hoop	8/90	40	0	154	MECH.
Allendale Farms	7/90	242	5.6	543.2	MECH.
Rushing	7/89	125	8.4	0	MECH.
Riley	7/90	30	8.4	3.2	MECH.
Bassie	6/92	85	36.4	35	MECH.
Spearo	4/93	40	28	65	Hand
Edwards	6/90	220	7	245	MECH.
Edwards	6/92	(Add.) 80	266	114.3	MECH.

ATKINSON	5/92	300	245	0	MECH.
Trainor #1	5/92	236	285.6	7	two dusing Airplane
Trainor #2	5/92		644	0	mech.
Trainor #3	5/92		397.6	28	2 dusing Airplane
Trainor #4	5/92	203	61.6	28	1 dusing Airplane
Dable Cypress	4/92	50	112	0	Hand
Harry Lott	6/90	30	0	1830	MECH.
Harry Lott	9/92	84	386.4	0	MECH.
DeLOACH	11/91	255	308	42	HAND MECH.
JAMES	10/91	100	464.8	327	MECH.
OLIVER, Roy	3/90	80	145.6	75	MECH.
Winchester	10/91	205	341.6	227.5	MECH.
Sherrington	5/92	52	50.4	1624	MECH.
DAHOMEY	90/91		112	170.8	HAND
Whitten	92		98	42	MECH.
Hester	4/92		187.6	0	MECH.

FY-93 WETLAND ACCOMPLISHMENTS

RESTORATION AND ENHANCEMENT

Askew	600 acres	Establish moist-soil units	MSU
Biles, Richard	186 acres	Re-Establish forested wetland	R
Biles, Richard	100 acres	Establish moist-soil units	MSU
Biddy	15 acres	Establish forested wetland	GT
Bowling, FMHA	121 acres	Re-Establish forested wetland	R
Bowling, FMHA	50 acres	Re-Establish emergent wetland	MSU
Campbell, D.	160 acres	Re-Establish forested wetland	R
Cockerham, D.C.	165 acres	Re-Establish forested wetland	R
Dahomey NWR	40 acres	Re-Establish forested wetland	R
Dodson, J.	187 acres	Re-Establish forested wetland	R
Edwards	80 acres	Re-Establish forested wetland	R
Gwin, FMHA	100 acres	Re-Establish emergent wetland	MSU
Gwin, FMHA	250 acres	Re-Establish forested wetland	R
Hobbs, Edgar	25 acres	Re-establish forested wetland	GT
Hawkins, B.	34 acres	Re-Establish forested wetland	R
Kolle, FMHA	50 acres	Establish moist-soil units	MSU
Kolle, FMHA	59 acres	Re-Establish forested wetland	R
Lindsey, FMHA	25 acres	Re-Establish forested wetland	R
Lott, H.	84 acres	Establish moist-soil units	MSU
Lott, H.	25 acres	Re-Establish forested wetland	R
Madden	172 acres	Establish forested wetland	GT
Oxberry Mgmt.	800 acres	Re-Establish forested wetland	R
Riverland Club	250 acres	Establish moist-soil units	MSU
Riverland Club	100 acres	Re-Establish forested wetland	R
Saunders, G.	60 acres	Re-Establish forested wetland	R
Spear, Reginald	40 acres	Re-Establish forested wetland	R
Starr, FMHA	25 acres	Re-Establish forested wetland	R
Strider	760 acres	Re-Establish forested wetland	R
Tallahatchie NWR	25 acres	Seasonally flood cropland	FC
Tallahatchie NWR	60 acres	Re-establish forested wetland	R
Trainor Farm	600 acres	Establish moist-soil units	MSU
Trainor Farm	77 acres	Re-Establish forested wetland	R
Whitten	61 acres	Re-Establish forested wetland	R
Williams, Duncan	163 acres	Re-Establish forested wetland	R
Williams, Earl	29 acres	Re-Establish forested wetland	R
TOTAL	5,578 ACRES		

WETLAND REHABILITATION

Upchurch	100 acres	Discing
Harris	100 acres	Discing and Mowing
Tallahatchie	400 acres	Discing
Gillion	200 acres	Discing
TOTAL	800 ACRES	

TOTAL FY-93 ACCOMPLISHMENTS 6378 ACRES

FY-93 WETLAND ACCOMPLISHMENTS

RESTORATION AND ENHANCEMENT

Askew	600 acres	Establish moist-soil units	MSU
Biles, Richard	186 acres	Re-Establish forested wetland	R
Biles, Richard	100 acres	Establish moist-soil units	MSU
Biddy	15 acres	Establish forested wetland	GT
Bowling, FMHA	121 acres	Re-Establish forested wetland	R
Bowling, FMHA	50 acres	Re-Establish emergent wetland	MSU
Campbell, D.	160 acres	Re-Establish forested wetland	R
Cockerham, D.C.	165 acres	Re-Establish forested wetland	R
Dahomey NWR	40 acres	Re-Establish forested wetland	R
Dodson, J.	187 acres	Re-Establish forested wetland	R
Edwards	80 acres	Re-Establish forested wetland	R
Gwin, FMHA	100 acres	Re-Establish emergent wetland	MSU
Gwin, FMHA	250 acres	Re-Establish forested wetland	R
Hobbs, Edgar	25 acres	Establish forested wetland	GT
Hawkins, B.	34 acres	Re-establish forested wetland	R
Korle, FMHA	50 acres	Re-Establish forested wetland	R
Kolle, FMHA	59 acres	Establish moist-soil units	MSU
Lindsey, FMHA	25 acres	Re-Establish forested wetland	R
Lott, H.	84 acres	Re-Establish forested wetland	R
Lott, H.	25 acres	Establish moist-soil units	MSU
Madden	172 acres	Re-Establish forested wetland	R
Oxberry Mgmt.	800 acres	Establish forested wetland	GT
Riverland Club	250 acres	Re-Establish forested wetland	R
Riverland Club	100 acres	Establish moist-soil units	MSU
Saunders, G.	60 acres	Re-Establish forested wetland	R
Spear, Reginald	40 acres	Re-Establish forested wetland	R
Starr, FMHA	25 acres	Re-Establish forested wetland	R
Strider	760 acres	Re-Establish forested wetland	R
Tallahatchie NWR	25 acres	Re-Establish forested wetland	R
Tallahatchie NWR	60 acres	Seasonally flood cropland	FC
Trainor Farm	600 acres	Re-establish forested wetland	R
Trainor Farm	77 acres	Establish moist-soil units	MSU
Whitten	61 acres	Re-Establish forested wetland	R
Williams, Duncan	163 acres	Re-Establish forested wetland	R
Williams, Earl	29 acres	Re-Establish forested wetland	R
TOTAL	5,578 ACRES		

WETLAND REHABILITATION

Upchurch	100 acres	Discing
Harris	100 acres	Discing and Mowing
Tallahatchie	400 acres	Discing
Gillion	200 acres	Discing
TOTAL	800 ACRES	

TOTAL FY-93 ACCOMPLISHMENTS 6378 ACRES

3. Forests

Reforestation efforts by hand, mechanical planting, or direct seeding of acorns was completed on the Gillon, Starr, and Watts fee-title FmHA properties for a total of 825 acres. Two private lands projects were planted for a total of 200 acres. An additional 103.3 acres on Dahomey NWR were planted with bottomland hardwood species.

Reproduction surveys continued to evaluate the success of past plantings.

Table 1. Total acreage and success of oak seeding on National Wildlife Refuge and private lands in Mississippi.

YEAR PLANTED	TOTAL ACRES	NO. ACRES SUCCESSFUL	PERCENT SUCCESSFUL	NO.PLANTED/ NO.SUCCESSFUL
1989	500	175	35.0%	3/1
1990	2,213	215	9.7%	15/2
1991	1,571	1,226	78.0%	9/8
1992	1,631	1,227	76.0%	12/7
1993	~~3,496~~ 3471	1,710 1930	48.9% 55.2	17/7 ~~17/8~~ 16/8
			55.6	

Table 2. Season planted and success of oak seeding on National Wildlife Refuge and private lands in Mississippi.

YEAR PLANTED	SEASON PLANTED	
	SPRING	FALL
1989	35.0%	0
1990	0	31.6%
1991	100%	74.5%
1992	74%	100%
1993		

Oct 1 92
Sep 93

FY-93 PROJECT LIST

	NAME	$	WORK	COMPLETED
	Oxberry	10,000	levee/WCS	
1/4/93	Lott ✓	4,500	trees/WCS	Oct.
	Biddy	2,500	w-box/WCS	
	Hobbs	1,875	WCS	Oct.
1/14/92	Campbell, D. ✓	6,400	trees	Oct.
	Dodson ✓	6,545	trees	
	Cockerham ✓	5,775	trees	
4	Strider ✓	10,000	trees	
	Madden ✓	6,020	trees	Oct.
1/14/93	Edwards ✓	2,800	trees	Nov.
	Williams ✓	1,150	trees	
	Spear ✓	1,400	trees	
	Williams, D. ✓	5,705	trees	
2	Grant ✓	10,000	trees,levee,WCS	
	Big Black (McCroy)	10,000	trees,levee,WCS	
3	Biles ✓	10,000	trees,levee,WCS	
3	Jones			
1.5	Bowling ✓	12,000	trees,levee,WCS	
1.5	Gwin ✓	15,000	trees,levee,WCS	
1.5	Kolle ✓	10,000	trees,levee,WCS	
	Maintenance	12,000	disc,levee,etc	
	Prestridge	10,000	well	
	Planter	5,600	planter	
	Acorns	10,000	acorns	Dec.
	Askew	85,000	levee,WCS	
	Haserway	00,000	signs	
	Gravel	25,000	gravel	
	Crowder	60,000	pump relo.	
	Dozer	7,000	dozer rehab.	Dec.

Table 2. Season planted and success of oak seeding on National Wildlife Refuge and private lands in Mississippi.

YEAR PLANTED	SEASON PLANTED	
	SPRING	FALL
1989	35.0%	0
1990	0	31.6%
1991	100%	74.5%
1992	74%	100%

This is what we want! (MWJ 10/94)

Gillem 60 A MSU ✓

230 A planted

Watts 68 A MSU ✓

Starr 67 A MSU ✓

325 A planted

Watts 270 planted

Bailey Battle 60 A MSU ✓ put. land

140 A planted

COE

Benwood

Bayley Bottom

Steider

150 A MSU ✓

250 A MSU planted put. land

180

180 MSU ✓

Jones Farm 507 A Planted Put. land

.1 A Demo

FY-94 PROJECTS

REFUGE:	TYPE:	FUNDING:	COMPLETED:
DAHOMEY GRAVEL	R	10K	
TALLAHATCHIE GRAVEL	R	10K	
DAHOMEY BRIDGE REHAB	R	25K	

FmHA:			
WETLAND DEMO	W	3K	
.5 WATTS	W/T	25K	
3 GILLON	W/T	25K	
1.5 STARR	W/T	25K	
REHAB	R	UF	

PRIVATE:			
1 PEDUCA WELLS	W/T	10K	
BAILEY BRAKE	W/T	10K	11/93
3 JONES (McIvoy)	W/T	10K	10/93
4 STRIDER	W/T	10K	760-9/93
HARTLEY	W	2K	
JENKINS	W/T	6.5K	
THOMAS	W	UF	

Mike Campbell

180-11/93

Not done yet